## **Amendments to the Claims**

This listing of claims will replace all prior versions, and listings, of claims in the application:

## **Listing of Claims:**

1. (Original) A compound having the formula:

where  $Y_1$  and  $Y_2$ , which may be the same or different, are each selected from the group consisting of hydrogen and a hydroxy-protecting group,  $R_6$  and  $R_8$ , which may be the same or different, are each selected from the group consisting of hydrogen, alkyl, hydroxyalkyl and fluoroalkyl, or, when taken together represent the group  $-(CH_2)_x$  where x is an integer from 2 to 5, and where the group R is represented by the structure:

where the stereochemical center at carbon 20 may have the R or S configuration, and where Z is selected from Y, -OY, -CH<sub>2</sub>OY, -C $\equiv$ CY and -CH=CHY, where the double bond may have the cis or trans geometry, and where Y is selected from hydrogen, methyl, -COR<sup>5</sup> and a radical of the structure:

$$R^{1}$$
  $R^{2}$   $R^{3}$   $C$   $CH_{2}$   $CH_{2}$   $R^{3}$   $R^{4}$ 

where m and n, independently, represent the integers from 0 to 5, where  $R^1$  is selected from hydrogen, deuterium, hydroxy, protected hydroxy, fluoro, trifluoromethyl, and  $C_{1-5}$ -alkyl, which may be straight chain or branched and, optionally, bear a hydroxy or protected-hydroxy substituent, and where each of  $R^2$ ,  $R^3$ , and  $R^4$ , independently, is selected from deuterium, deuteroalkyl, hydrogen, fluoro, trifluoromethyl and  $C_{1-5}$  alkyl, which may be straight-chain or branched, and optionally, bear a hydroxy or protected-hydroxy substituent, and where  $R^1$  and  $R^2$ , taken together, represent an oxo group, or an alkylidene group,  $= CR^2R^3$ , or the group  $-(CH_2)_p$ -, where p is an integer from 2 to 5, and where  $R^3$  and  $R^4$ , taken together, represent an oxo group, or the group  $-(CH_2)_q$ -, where q is an integer from 2 to 5, and where  $R^5$  represents hydrogen, hydroxy, protected hydroxy, or  $C_{1-5}$  alkyl and wherein any of the CH-groups at positions 20, 22, or 23 in the side chain may be replaced by a nitrogen atom, or where any of the groups  $-CH(CH_3)$ -,  $-(CH_2)$ n-, or  $-(CR_1R_2)$ - at positions 20, 22, and 23, respectively, may be replaced by an oxygen or sulfur atom.

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2. (Currently Amended) The compound of claim 1 where R is a side chain of the formula

3. (Currently Amended) The compound of claim 1 where R is a side chain of the formula

5. (Currently Amended) The compound of claim 1 where R is a side chain of the formula

6. (Currently Amended) The compound of claim 1 where R is a side chain of the formula

8. (Currently Amended) The compound of claim 1 where R is a side chain of the formula

9. (Currently Amended) The compound of claim 1 where R is a side chain of the formula

- 12. (Original) (20S)-2-methylene-18,19-dinor- $1\alpha$ ,25-dihydroxyvitamin D<sub>3</sub>.
- 13. (Original) A pharmaceutical composition containing an effective amount of at least one compound as claimed in claim 1 together with a pharmaceutically acceptable excipient.
- 14. (Original) The pharmaceutical composition of claim 13 wherein said effective amount comprises from about 0.01µg to about 100µg per gram of composition.
- 15. (Original) The pharmaceutical composition of claim 13 wherein said effective amount comprises from about 0.1µg to about 50µg per gram of composition.
- 16. (Original) The pharmaceutical composition of claim 13 containing (20S)-2-methylene-18,19-dinor- $1\alpha$ ,25-dihydroxyvitamin  $D_3$  in an amount from about  $0.01\mu g$  to about  $100\mu g$ .
- 17. (Original) The pharmaceutical composition of claim 13 containing (20S)-2-methylene-18,19-dinor-1 $\alpha$ ,25-dihydroxyvitamin D<sub>3</sub> in an amount from about 0.1 $\mu$ g to about 50 $\mu$ g.

## 18.-21. (Cancelled)

22. (Original) A method of treating metabolic bone disease where it is desired to maintain or increase bone mass comprising administering to a patient with said disease an effective amount of a compound having the formula:

$$Y_2O^{H}$$
 $R_6$ 
 $R_8$ 
 $OY_1$ 

where  $Y_1$  and  $Y_2$ , which may be the same or different, are each selected from the group consisting of hydrogen and a hydroxy-protecting group,  $R_6$  and  $R_8$ , which may be the same or different, are each selected from the group consisting of hydrogen, alkyl, hydroxyalkyl and fluoroalkyl, or, when taken together represent the group  $-(CH_2)_x$  where x is an integer from 2 to 5, and where the group R is represented by the structure:

where the stereochemical center at carbon 20 may have the R or S configuration, and where Z is selected from Y, -OY, -CH<sub>2</sub>OY, -C $\equiv$ CY and -CH=CHY, where the double

bond may have the cis or trans geometry, and where Y is selected from hydrogen, methyl, -COR<sup>5</sup> and a radical of the structure:

$$-(CH_2)_m$$
  $-(CH_2)_n$   $-(CH$ 

where m and n, independently, represent the integers from 0 to 5, where  $R^1$  is selected from hydrogen, deuterium, hydroxy, protected hydroxy, fluoro, trifluoromethyl, and  $C_{1-5}$ -alkyl, which may be straight chain or branched and, optionally, bear a hydroxy or protected-hydroxy substituent, and where each of  $R^2$ ,  $R^3$ , and  $R^4$ , independently, is selected from deuterium, deuteroalkyl, hydrogen, fluoro, trifluoromethyl and  $C_{1-5}$  alkyl, which may be straight-chain or branched, and optionally, bear a hydroxy or protected-hydroxy substituent, and where  $R^1$  and  $R^2$ , taken together, represent an oxo group, or an alkylidene group,  $=CR^2R^3$ , or the group  $-(CH_2)_p$ -, where p is an integer from 2 to 5, and where  $R^3$  and  $R^4$ , taken together, represent an oxo group, or the group  $-(CH_2)_q$ -, where q is an integer from 2 to 5, and where  $R^5$  represents hydrogen, hydroxy, protected hydroxy, or  $C_{1-5}$  alkyl and wherein any of the CH-groups at positions 20, 22, or 23 in the side chain may be replaced by a nitrogen atom, or where any of the groups  $-CH(CH_3)$ -,  $-(CH_2)_m$ -,  $-(CH_2)_n$ - or  $-(CR_1R_2)$ - at positions 20, 22, and 23, respectively, may be replaced by an oxygen or sulfur atom.

- 23. (Original) The method of claim 22 where the disease is senile osteoporosis.
- 24. (Original) The method of claim 22 where the disease is postmenopausal osteoporosis.

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- 25. (Original) The method of claim 22 where the disease is steroid-induced osteoporosis.
- 26. (Original) The method of claim 22 where the disease is low bone turnover osteoporosis.
  - 27. (Original) The method of claim 22 where the disease is osteomalacia.
- 28. (Original) The method of claim 22 where the disease is renal osteodystrophy.
- 29. (Original) The method of claim 22 wherein the compound is administered orally.
- 30. (Original) The method of claim 22 wherein the compound is administered parenterally.
- 31. (Original) The method of claim 22 wherein the compound is administered transdermally.
- 32. (Original) The method of claim 22 wherein the compound is administered in a dosage of from  $0.01\mu g$  to  $100\mu g$  per day.
- 33. (Original) The method of claim 22 wherein the compound is (20S)-2-methylene-18,19-dinor-1 $\alpha$ ,25-dihydroxyvitamin D<sub>3</sub>.

34. (Original) A method of treating psoriasis comprising administering to a patient with psoriasis an effective amount of a compound having the formula:

where  $Y_1$  and  $Y_2$ , which may be the same or different, are each selected from the group consisting of hydrogen and a hydroxy-protecting group,  $R_6$  and  $R_8$ , which may be the same or different, are each selected from the group consisting of hydrogen, alkyl, hydroxyalkyl and fluoroalkyl, or, when taken together represent the group  $-(CH_2)_x$  where x is an integer from 2 to 5, and where the group R is represented by the structure:

where the stereochemical center at carbon 20 may have the R or S configuration, and where Z is selected from Y, -OY, -CH<sub>2</sub>OY, -C $\equiv$ CY and -CH=CHY, where the double bond may have the cis or trans geometry, and where Y is selected from hydrogen, methyl, -COR<sup>5</sup> and a radical of the structure:

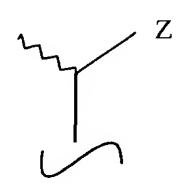
$$R^{1}$$
  $R^{2}$   $R^{3}$   $C$   $CH_{2}$   $CH_{2}$   $R^{5}$   $R^{4}$ 

where m and n, independently, represent the integers from 0 to 5, where  $R^1$  is selected from hydrogen, deuterium, hydroxy, protected hydroxy, fluoro, trifluoromethyl, and  $C_{1-5}$ -alkyl, which may be straight chain or branched and, optionally, bear a hydroxy or protected-hydroxy substituent, and where each of  $R^2$ ,  $R^3$ , and  $R^4$ , independently, is selected from deuterium, deuteroalkyl, hydrogen, fluoro, trifluoromethyl and  $C_{1-5}$  alkyl, which may be straight-chain or branched, and optionally, bear a hydroxy or protected-hydroxy substituent, and where  $R^1$  and  $R^2$ , taken together, represent an oxo group, or an alkylidene group, = $CR^2R^3$ , or the group - $(CH_2)_p$ -, where p is an integer from 2 to 5, and where  $R^3$  and  $R^4$ , taken together, represent an oxo group, or the group - $(CH_2)_q$ -, where q is an integer from 2 to 5, and where  $R^5$  represents hydrogen, hydroxy, protected hydroxy, or  $C_{1-5}$  alkyl and wherein any of the CH-groups at positions 20, 22, or 23 in the side chain may be replaced by a nitrogen atom, or where any of the groups - $CH(CH_3)$ -, - $(CH_2)_m$ -, - $(CH_2)_n$ - or  $(CR_1R_2)$ - at positions 20, 22, and 23, respectively, may be replaced by an oxygen or sulfur atom.

- 35. (Original) The method of claim 34 wherein the compound is administered orally.
- 36. (Original) The method of claim 34 wherein the compound is administered parenterally.
- 37. (Original) The method of claim 34 wherein the compound is administered transdermally.

- 38. (Original) The method of claim 34 wherein the compound is administered topically.
- 39. (Original) The method of claim 34 wherein the compound is (20S)-2-methylene-18,19-dinor-1 $\alpha$ ,25-dihydroxyvitamin D<sub>3</sub>.
- 40. (Original) The method of claim 34 wherein said effective amount comprises about 0.01μg/day to about 100μg/day of said compound.
- 41. (Original) A method of treating leukemia, colon cancer, breast cancer, skin cancer or prostate cancer comprising administering to a patient an effective amount of a compound having the formula:

where  $Y_1$  and  $Y_2$ , which may be the same or different, are each selected from the group consisting of hydrogen and a hydroxy-protecting group,  $R_6$  and  $R_8$ , which may be the same or different, are each selected from the group consisting of hydrogen, alkyl, hydroxyalkyl and fluoroalkyl, or, when taken together represent the group  $-(CH_2)_x$  where x is an integer from 2 to 5, and where the group R is represented by the structure:



where the stereochemical center at carbon 20 may have the R or S configuration, and where Z is selected from Y, -OY, -CH<sub>2</sub>OY, -C $\equiv$ CY and -CH $\equiv$ CHY, where the double bond may have the cis or trans geometry, and where Y is selected from hydrogen, methyl, -COR<sup>5</sup> and a radical of the structure:

$$-(CH_2)_m$$
  $-(CH_2)_n$   $-(CH$ 

where m and n, independently, represent the integers from 0 to 5, where  $R^1$  is selected from hydrogen, deuterium, hydroxy, protected hydroxy, fluoro, trifluoromethyl, and  $C_{1-5}$ -alkyl, which may be straight chain or branched and, optionally, bear a hydroxy or protected-hydroxy substituent, and where each of  $R^2$ ,  $R^3$ , and  $R^4$ , independently, is selected from deuterium, deuteroalkyl, hydrogen, fluoro, trifluoromethyl and  $C_{1-5}$  alkyl, which may be straight-chain or branched, and optionally, bear a hydroxy or protected-hydroxy substituent, and where  $R^1$  and  $R^2$ , taken together, represent an oxo group, or an alkylidene group,  $=CR^2R^3$ , or the group  $-(CH_2)_{p^-}$ , where p is an integer from 2 to 5, and where  $R^3$  and  $R^4$ , taken together, represent an oxo group, or the group  $-(CH_2)_{q^-}$ , where q is an integer from 2 to 5, and where  $R^5$  represents hydrogen, hydroxy, protected hydroxy, or  $C_{1-5}$  alkyl and wherein any of the CH-groups at positions 20, 22, or 23 in the side chain may be replaced by a nitrogen atom, or where any of the groups  $-CH(CH_3)$ -,  $-(CH_2)_{m^-}$ ,  $-(CH_2)_{n^-}$  or  $(CR_1R_2)$ - at positions 20, 22, and 23, respectively, may be replaced by an oxygen or sulfur atom.

- 42. (Original) The method of claim 41 wherein the compound is administered orally.
- 43. (Original) The method of claim 41 wherein the compound is administered parenterally.
- 44. (Original) The method of claim 41 wherein the compound is administered transdermally.
- 45. (Original) The method of claim 41 wherein the compound is administered in a dosage of from about  $0.01\mu g/day$  to about  $100 \mu g/day$ .
- 46. (Original) The method of claim 41 wherein the compound is (20S)-2-methylene-18,19-dinor-1 $\alpha$ ,25-dihydroxyvitamin D<sub>3</sub>.
- 47. (Original) A method of increasing the strength of a bone comprising administering to a patient in need of such treatment an effective amount of a compound having the formula:

$$Y_2O^{11}$$
 $R_6$ 
 $R_8$ 

where  $Y_1$  and  $Y_2$ , which may be the same or different, are each selected from the group consisting of hydrogen and a hydroxy-protecting group,  $R_6$  and  $R_8$ , which may be the same or different, are each selected from the group consisting of hydrogen, alkyl, hydroxyalkyl and fluoroalkyl, or, when taken together represent the group  $-(CH_2)_x$  where X is an integer from 2 to 5, and where the group R is represented by the structure:

where the stereochemical center at carbon 20 may have the R or S configuration, and where Z is selected from Y, -OY, -CH<sub>2</sub>OY, -C $\equiv$ CY and -CH $\equiv$ CHY, where the double bond may have the cis or trans geometry, and where Y is selected from hydrogen, methyl, -COR<sup>5</sup> and a radical of the structure:

$$-(CH_2)_m$$
  $-(CH_2)_m$   $-(CH_2)_n$   $-(CH_2)_m$   $-(CH$ 

where m and n, independently, represent the integers from 0 to 5, where  $R^1$  is selected from hydrogen, deuterium, hydroxy, protected hydroxy, fluoro, trifluoromethyl, and  $C_{1-5}$ -alkyl, which may be straight chain or branched and, optionally, bear a hydroxy or protected-hydroxy substituent, and where each of  $R^2$ ,  $R^3$ , and  $R^4$ , independently, is selected from deuterium, deuteroalkyl, hydrogen, fluoro, trifluoromethyl and  $C_{1-5}$  alkyl, which may be straight-chain or branched, and optionally, bear a hydroxy or protected-hydroxy substituent, and where  $R^1$  and  $R^2$ , taken together, represent an oxo group, or an alkylidene group, = $CR^2R^3$ , or the group - $(CH_2)_p$ -, where p is an integer from 2 to 5, and where  $R^3$  and  $R^4$ , taken together, represent an oxo group, or the group - $(CH_2)_q$ -, where q

is an integer from 2 to 5, and where  $R^5$  represents hydrogen, hydroxy, protected hydroxy, or  $C_{1-5}$  alkyl and wherein any of the CH-groups at positions 20, 22, or 23 in the side chain may be replaced by a nitrogen atom, or where any of the groups -CH(CH<sub>3</sub>)-, -(CH<sub>2</sub>)<sub>m</sub>-, -(CH<sub>2</sub>)<sub>n</sub>- or (CR<sub>1</sub>R<sub>2</sub>)- at positions 20, 22, and 23, respectively, may be replaced by an oxygen or sulfur atom.

- 48. (Original) The method of claim 47 wherein the bone strength is cortical strength.
- 49. (Original) The method of claim 47 wherein the bone strength is trabecular strength.
- 50. (Original) The method of claim 47 wherein the compound is administered orally.
- 51. (Original) The method of claim 47 wherein the compound is administered parenterally.
- 52. (Original) The method of claim 47 wherein the compound is administered transdermally.
- 53. (Original) The method of claim 47 wherein the compound is administered in a dosage of from  $0.01\mu g$  to  $100\mu g$  per day.
- 54. (Original) The method of claim 47 wherein the compound is (20S)-2-methylene-18,19-dinor-1 $\alpha$ ,25-dihydroxyvitamin D<sub>3</sub>.

55. (Currently Amended) A method of treating an autoimmune disease <u>selected</u> from a group consisting of multiple sclerosis, diabetes mellitus, lupus, host versus graft reaction, rejection of transplants, rheumatoid arthritis, and inflammatory bowel disease, the method comprising administering to a patient with said disease an effective amount of a compound having the formula

where  $Y_1$  and  $Y_2$  which may be the same or different, are each selected from the group consisting of hydrogen and a hydroxy-protecting group,  $R_6$  and  $R_8$ , which may be the same or different, are each selected from the group consisting of hydrogen, alkyl, hydroxyalkyl and fluoroalkyl, or, when taken together represent the group  $-(CH_2)_x$  where x is an integer from 2 to 5, and where the group R is represented by the structure:

where the stereochemical center at carbon 20 may have the R or S configuration, and where Z is selected from Y, -OY, -CH<sub>2</sub>OY, -C $\equiv$ CY and -CH=CHY, where the double

bond may have the cis or trans geometry, and where Y is selected from hydrogen, methyl, -COR<sup>5</sup> and a radical of the structure:

$$R^{1}$$
  $R^{2}$   $R^{3}$   $R^{5}$   $R^{5}$   $R^{4}$ 

where m and n, independently, represent the integers from 0 to 5, where  $R^1$  is selected from hydrogen, deuterium, hydroxy, protected hydroxy, fluoro, trifluoromethyl, and  $C_{1-5}$ -alkyl, which may be straight chain or branched and, optionally, bear a hydroxy or protected-hydroxy substituent, and where each of  $R^2$ ,  $R^3$ , and  $R^4$ , independently, is selected from deuterium, deuteroalkyl, hydrogen, fluoro, trifluoromethyl and  $C_{1-5}$  alkyl, which may be straight-chain or branched, and optionally, bear a hydroxy or protected-hydroxy substituent, and where  $R^1$  and  $R^2$ , taken together, represent an oxo group, or an alkylidene group, = $CR^2R^3$ , or the group - $(CH_2)_p$ -, where p is an integer from 2 to 5, and where  $R^3$  and  $R^4$ , taken together, represent an oxo group, or the group - $(CH_2)_q$ -, where q is an integer from 2 to 5, and where  $R^5$  represents hydrogen, hydroxy, protected hydroxy, or  $C_{1-5}$  alkyl and wherein any of the CH-groups at positions 20, 22, or 23 in the side chain may be replaced by a nitrogen atom, or where any of the groups - $CH(CH_3)$ -, - $(CH_2)$ n-, or - $(CR_1R_2)$ - at positions 20, 22, and 23, respectively, may be replaced by an oxygen or sulfur atom.

- 56. (Original) The method of claim 55 where the disease is multiple sclerosis.
- 57. (Original) The method of claim 55 where the disease is diabetes mellitus.
- 58. (Original) The method of claim 55 where the disease is lupus.

- 59. (Original) The method of claim 55 wherein the compound is administered orally.
- 60. (Original) The method of claim 55 wherein the compound is administered parenterally.
- 61. (Currently Amended) Them The method of claim 55 wherein the compound is administered transdermally.
- 62. (Original) The method of claim 55 wherein the compound is administered in a dosage of from about 0.01  $\mu$ g/day to about 100  $\mu$ g/day.
- 63. (Original) The method of claim 55 wherein the compound is (20S)-2-methylene-18,19-dinor- $1\alpha$ ,25-dihydroxyvitamin D<sub>3</sub>.
- 64. (Original) A method of treating an inflammatory bowel disease comprising administering to a patient with said disease an effective amount of a compound having the formula

where Y<sub>1</sub> and Y<sub>2</sub> which the same or different, are each selected from the group consisting of hydrogen and a hydroxy-protecting group, R<sub>6</sub> and R<sub>8</sub>, which may be the same or different, are each selected from the group consisting of hydrogen, alkyl, hydroxyalkyl

and fluoroalkyl, or, when taken together represent the group  $-(CH_2)_x$  where x is an integer from 2 to 5, and where the group R is represented by the structure:

where the stereochemical center at carbon 20 may have the R or S configuration, and where Z is selected from Y, -OY, -CH<sub>2</sub>OY, -C $\equiv$ CY and -CH $\equiv$ CHY, where the double bond may have the cis or trans geometry, and where Y is selected from hydrogen, methyl, -COR<sup>5</sup> and a radical of the structure:

$$-(CH_2)_m$$
  $-(CH_2)_n$   $-(CH$ 

where m and n, independently, represent the integers from 0 to 5, where  $R^1$  is selected from hydrogen, deuterium, hydroxy, protected hydroxy, fluoro, trifluoromethyl, and  $C_{1-5}$ -alkyl, which may be straight chain or branched and, optionally, bear a hydroxy or protected-hydroxy substituent, and where each of  $R^2$ ,  $R^3$ , and  $R^4$ , independently, is selected from deuterium, deuteroalkyl, hydrogen, fluoro, trifluoromethyl and  $C_{1-5}$  alkyl, which may be straight-chain or branched, and optionally, bear a hydroxy or protected-hydroxy substituent, and where  $R^1$  and  $R^2$ , taken together, represent an oxo group, or an alkylidene group, = $CR^2R^3$ , or the group - $(CH_2)_p$ -, where p is an integer from 2 to 5, and where  $R^3$  and  $R^4$ , taken together, represents an oxo group, or the group - $(CH_2)_q$ -, where q is an integer from 2 to 5, and where  $R^5$  represents hydrogen, hydroxy, protected hydroxy,

or  $C_{1-5}$  alkyl and wherein any of the CH-groups at positions 20, 22, or 23 in the side chain may be replaced by a nitrogen atom, or where any of the groups -CH(CH<sub>3</sub>)-, -(CH<sub>2</sub>)m-, -(CH<sub>2</sub>)n-, or -(CR<sub>1</sub>R<sub>2</sub>)- at positions 20, 22, and 23, respectively, may be replaced by an oxygen or sulfur atom.

- 65. (Original) The method of claim 64 wherein the disease is Crohn's disease.
- 66. (Original) The method of claim 64 wherein the disease is ulcerative colitis.
- 67. (Original) The method of claim 64 wherein the compound is administered orally.
- 68. (Original) The method of claim 64 wherein the compound is administered parenterally.
- 69. (Original) The method of claim 64 wherein the compound is administered transdermally.
- 70. (Original) The method of claim 64 wherein the compound is administered in a dosage of from about  $0.01 \mu g/day$  to about  $100 \mu g/day$ .
- 71. (Original) The method of claim 64 wherein the compound is (20S)-2-methylene-18,19-dinor-1 $\alpha$ ,25-dihydroxyvitamin D<sub>3</sub>.